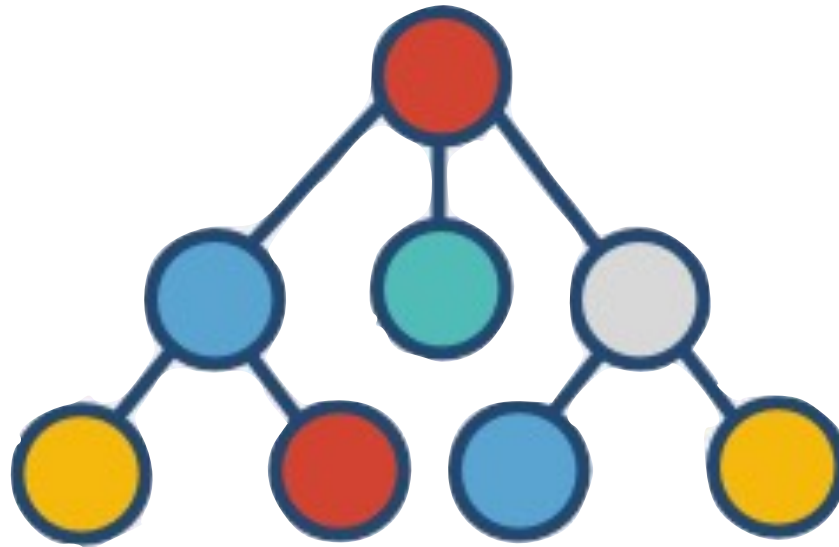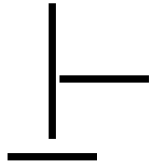# DATA STRUCTURE & ALGORITHMS
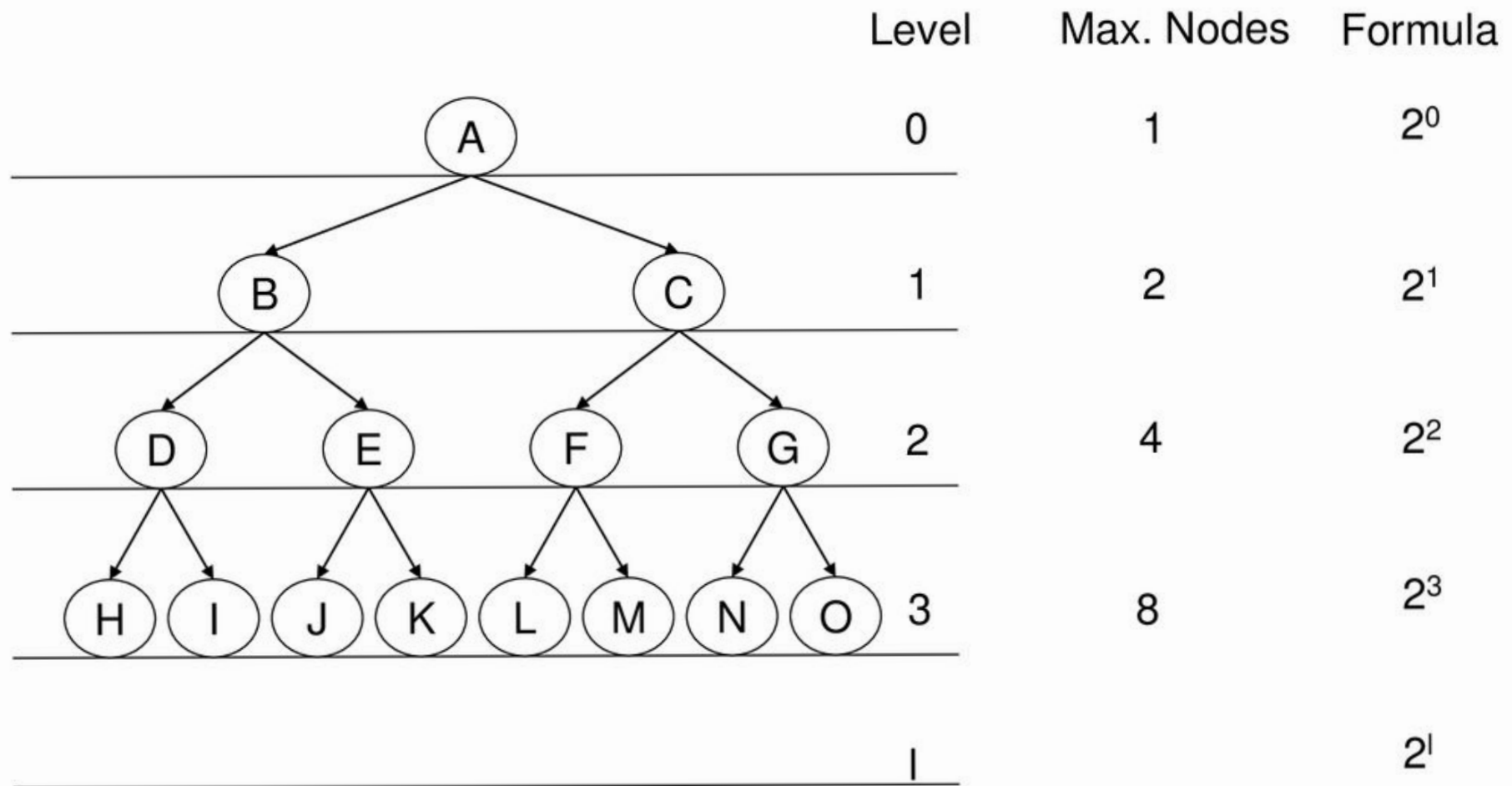

(By Prince Agarwal)

["HELLO WORLD"]

PROPERTIES OF BINARY TREE IN C++

PROPERTIES OF BINARY TREE ?

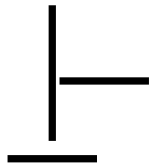**The maximum number of nodes at level 'l' of a binary tree is 2^l.**
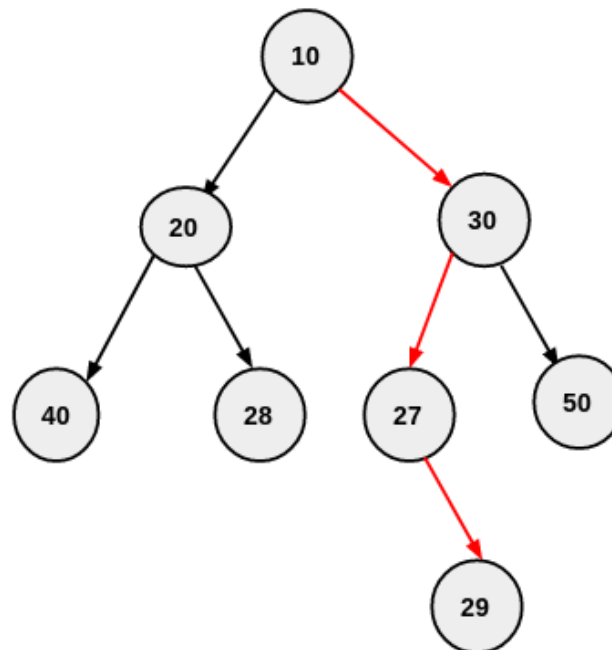
Hello world

PROPERTIES OF BINARY TREE IN C++

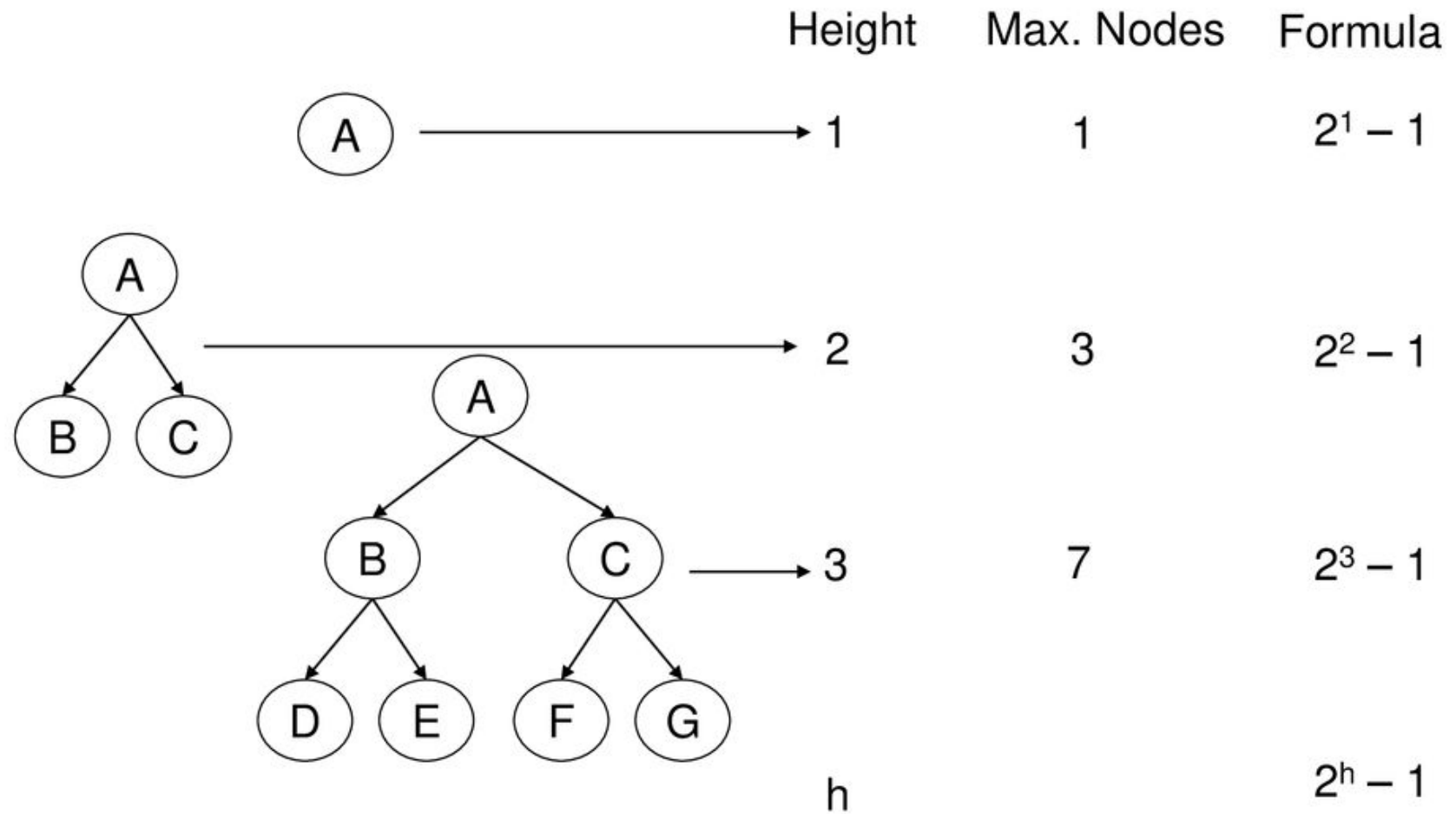|	Level	Max. Nodes	Formula
A	0	1	2^0
B C	1	2	2^1
D E F G	2	4	2^2
H I J K L M N O	3	8	2^3
	I		2^I

PROPERTIES OF BINARY TREE ?

- **Maximum number of nodes in a binary tree of height 'h' is $2^h - 1$.**
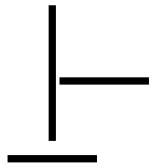
Height of Tree

Hello world

PROPERTIES OF BINARY TREE IN C++

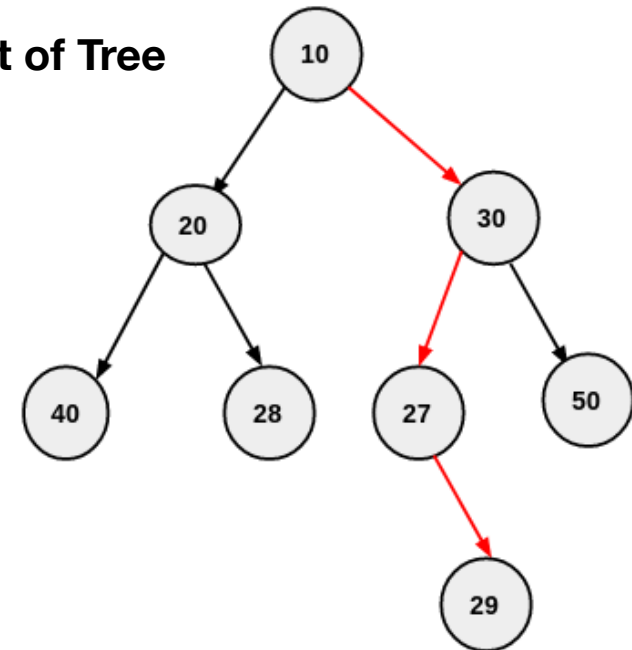|	Height	Max. Nodes	Formula
A	1	1	$2^1 - 1$
A → B, C	2	3	$2^2 - 1$
A → B (D, E), C (F, G)	3	7	$2^3 - 1$
	h		$2^h - 1$

Hello world

PROPERTIES OF BINARY TREE ?

Maximum number of nodes in a binary tree of height 'h' is $2^h - 1$.

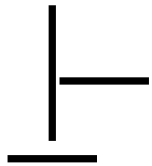In some books, height of the root is considered as 0. In this convention, the above formula becomes $2^{h+1} - 1$

Height of Tree

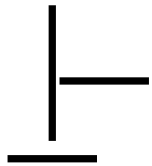*Hello world*

□ **PROPERTIES OF BINARY TREE ?**

└── □ **In a Binary Tree with N nodes, minimum possible height**
or minimum number of levels is ? Log$_2$(N+1) - 1

Level	Max. Nodes	Formula
0	1	2^0
1	2	2^1
2	4	2^2
3	8	2^3

N nodes   —>. $2^{h+1} - 1$ (if Level = 0)

(N + 1) nodes   —>. 2^{h+1}

(N + 1) nodes   —>. 2^{h+1}

(N + 1) nodes   —>. 2^{h+1}

Log$_2$(N+1) nodes   —>.   H +1

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PROPERTIES OF BINARY TREE ?

In Binary tree where every node has 0 or 2 children,
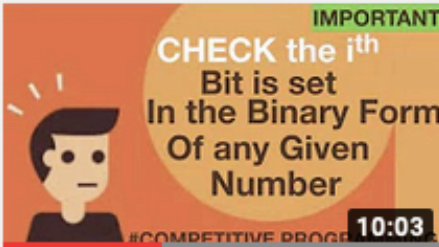number of leaf nodes is always one more than nodes with two children.

	Level	Max. Nodes	Formula
A	0	1	2^0
B C	1	2	2^1
D E F G	2	4	2^2
H I J K L M N O	3	8	2^3
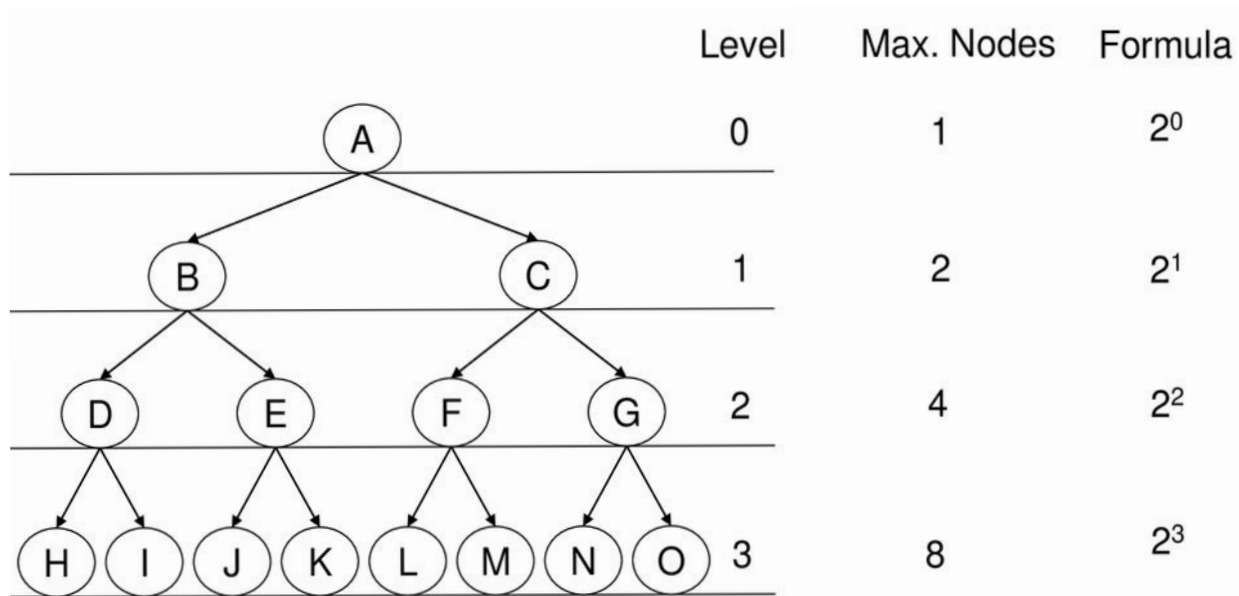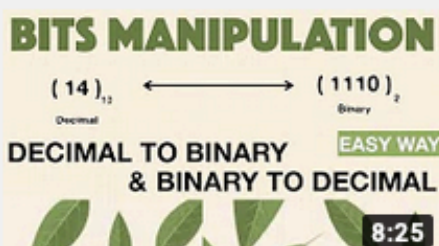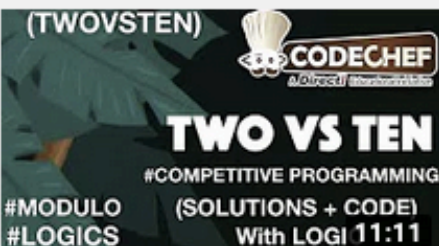
Total no. of Nodes with 2 children = 7

So, Toal number of leaf Nodes. = 7+1 = 8

If you want Proof Then Please **Handshaking Lemma**

Hello world

Check the ith bit is set, in the binary form of given numbe...

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Check a given number is power of 2 | Bitwise operato...

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